EPA Region 7 TMDL Review

TMDL ID: IA 02-CED-0218_0 **State:** IA
Document Name: MC LOUD RUN

Basin(s): Cedar River
HUC(s): 07080205
Water body(ies): MCCLOUD RUN
Tributary(ies): NONE
Pollutant(s): TEMPERATURE

Submittal Date: 6/11/2007 **Approved:** Yes

Submittal Letter

State submittal letter indicates final Total Maximum Daily Load(s) (TMDL) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act [40 CFR § 130.7(c)(1)]. Include date submitted letter was received by EPA, date of receipt of any revisions, and the date of original approval if submittal is a phase II TMDL.

The TMDL was officially submitted by the State of Iowa in a letter dated June 6, 2007 and received by the EPA on June 11, 2007.

Water Quality Standards Attainment

The water body's loading capacity (LC) for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards (WQS) [40 CFR § 130.7(c)(1)]. A statement that WQS will be attained is made.

McLoud Run was first listed on the State of Iowa's 303(d) list in 2002 for thermal modifications (temperature impairment). McLoud Run's heat loading capacity ranges from 6.0 x 105 to 3.3 x 107 kilojoules per day depending on flow conditions. WQS that apply to McLoud Run include a maximum water temperature increase of 1degree Celsius per hour. This target is based on acute changes in water temperature resulting from direct, anthropogenic additions of heat to the stream (point sources). If this target is met, the water body should meet the WQS.

Numeric Target(s)

Submittal describes applicable WQS, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

The TMDL describes all applicable WQS and all beneficial uses (primary contact recreation and warm water aquatic life). The impaired use is warm water aquatic life (Class B(WW-1)). The target is for the rate of temperature change not to exceed 1 degree Celsius per hour, a state WQS.

Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety (MOS) that do not exceed the LC. If submittal is a phase II TMDL there are refined relationships linking the load to WQS attainment. If there is an increase in the TMDL there is a refined relationship specified to validate the increase in TMDL (either load allocation (LA) or waste load allocation (WLA)). This section will compare and validate the change in targeted load between the versions.

Temperature (heat) from surface runoff is the critical physical factor affecting aquatic life and is translated in this TMDL as a concentration of heat energy in the water. This means that the stream temperature is dependant upon both the heat load and water volume. A simple heat balance equation was used to directly relate changes in water temperature and discharge to mass heat load. A load duration curve was developed to determine the TMDL.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, nonpoint and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered. If this is a phase II TMDL any new sources or removed sources will be specified and explained.

Land use and sources in the watershed are described. The heat pollution in McLoud Run originates from dispersed, impervious areas throughout the watershed delivered via point source stormwater outfalls. These outfalls are covered by NPDES (Municipal Separate Storm Sewer Systems (MS4s)) permits for the cities of Cedar Rapids (IA5715005) and Hiawatha (IA5735000). Results from the Temperature Urban Runoff Model confirmed that areas with large amounts of connected impervious area and which are closest to the stream or connected via storm sewer have the highest predicted runoff temperatures reaching the stream. All significant sources seem to have been identified.

Allocation - Loading Capacity

Submittal identifies appropriate WLA for point, and load allocations for nonpoint sources. If no point sources are present the WLA is stated as zero. If no nonpoint sources are present, the LA is stated as zero [40 CFR § 130.2(i)]. If this is a phase II TMDL the change in LC will be documented in this section.

LCs are given in heat loads per day and shown in the table below for selected flows. The TMDL, expressed as a load duration curve, displays the targets over a range of flow. However, it should be noted that for all practical purposes, compliance with the WQS must be based on stream temperature change on an hourly time interval, not heat loading, to determine if warm water aquatic life support B (WW-1) is met.

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s) [40 CFR § 130.7(c)(1)]. Critical conditions are factors such as flow or temperature which may lead to the excursion of WQS. If this is a phase II TMDL any differences in conditions will be documented in this section.

The critical environmental conditions for McLoud Run are when the stream is at base flow (low flow) discharge and when extreme heat (air temperatures over 90 degrees Fahrenheit) occurs for multiple days. Any rainfall in these circumstances, typically from April to October, is included in these critical conditions. The TMDL accounts for these critical conditions by using them to characterize the stream for modeling purposes.

Public Participation

Submittal describes required public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s) [40 CFR § 130.7(c)(1)(ii)].

Public participation included two meetings in Cedar Rapids on October 2, 2006 and May 2, 2007. Stakeholders at the meeting included city government officials from Hiawatha and Cedar Rapids, the Hawkeye Fly Fisherman Association, Iowa Chapter of the Sierra Club, Coe College, and local citizens. Comments from these meetings were incorporated into the submittal where appropriate. Additionally, the draft TMDL was posted on the IDNR web site. Copies of comments from the City of Cedar Rapids and the EPA were included with the submittal. EPA feels the IDNR response to comments adequately addresses the concerns raised.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used) [40 CFR § 130.7].

A comprehensive monitoring plan is being designed by state and local government officials as well as other stakeholders. The plan will focus on diagnostic monitoring to better determine major pollutant sources and causes, and a Best Management Practices (BMPs) performance evaluation. The submittal acknowledges that it is a first phase TMDL which requires monitoring to evaluate the effectiveness of the target identified in the TMDL. Temperature and flow samples will be taken at storm sewer outfalls, tributary inflows, and paired points in McLoud Run. Time frame identified for these and possible additional samples is 2008-2012.

Reasonable Assurance

Reasonable assurance only applies when less stringent WLAs are assigned based on the assumption of nonpoint source reductions in the LA will be met [40 CFR § 130.2(i)]. This section can also contain statements made by the state concerning the state's authority to control pollutant loads.

There are no nonpoint sources loadings in the watershed so reasonable assurance is not required. The two point sources, the cities of Cedar Rapids and Hiawatha's MS4s, are covered by NPDES permits.

Table 2. Selected TMDL values for various flow conditions.

Flow Percentile	Flow Conditions	Discharge Range[†]	Maximum Temp. Change	Maximum Loading Capacity (Kilojoules/second)	TMDL (Kilojoules/day)
0-10%	High Flows	> 3.19 cfs	1° C/hour	377	3.3×10^{7}
10-40%	Moist Conditions	1.15 – 3.19 cfs	1° C/hour	136	1.2×10^{7}
40-60%	Mid-Range Flows	0.62 – 1.15 cfs	1° C/hour	73	6.3×10^{6}
60-90%	Dry Conditions	0.10 – 0.62 cfs	1° C/hour	12	1.1×10^{6}
90-100%	Low Flows	0.06 – 0.10 cfs	1° C/hour	7	6.0×10^{5}

[†]Based on one season of flow data (2006). Table values may need adjusted as more data is collected.

WLA Comment

Submittal lists individual WLAs for each identified point source [40 CFR § 130.2(h)]. If a WLA is not assigned it must be shown that the discharge does not cause or contribute to WQS excursions, the source is contained in a general permit addressed by the TMDL, or extenuating circumstances exist which prevent assignment of individual WLAs. Any such exceptions must be explained to a satisfactory degree. If a WLA of zero is assigned to any facility it must be stated as such [40 CFR § 130.2(i)]. If this is a phase II TMDL any differences in phase I and phase II WLAs will be documented in this section.

The WLA allocation is divided between the two point sources, MS4s for the cities of Cedar Rapids and Hiawatha, based on their respective area's contribution to McLoud Run. Therefore, 87% of the WLA is applied to the City of Cedar Rapids' MS4 and 13% is applied to the City of Hiawatha's MS4.

LA Comment

Includes all nonpoint sources loads, natural background, and potential for future growth. If no nonpoint sources are identified the LA must be given as zero [40 CFR § 130.2(g)]. If this is a phase II TMDL any differences in phase I and phase II LAs will be documented in this section.

The LA for this TMDL is set at zero. The WQS are not applicable to natural background inputs such as solar radiation. Additionally, the entire watershed is covered by NPDES permits for MS4s for the cities of Cedar Rapids and Hiawatha. Moreover, the McLoud Run watershed is almost completely urbanized and highly developed, with little to no room for impervious surface growth. City ordinance ensures that any new or redevelopment complies with water pollution control measures.

Margin of Safety

Submittal describes explicit and/or implicit MOS for each pollutant [40 CFR § 130.7(c)(1)]. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided. If this is a phase II TMDL any differences in MOS will be documented in this section.

The MOS is implicit for temperature. This results from several conservative assumptions, including using a steady-state mathematical model to calculate the TMDL and focusing on ambient low-flow conditions when the stream is most vulnerable to thermal shock. Additionally, the model assumes instantaneous and even mixing of heat throughout the water column, which does not take into account the heat buffering capacity of pools, bank hides, and other structures.

Seasonal Variation and Critical Conditions